

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 18 June 2001 (18.06.01)	
International application No. PCT/US99/22882	Applicant's or agent's file reference DN1999219PCT
International filing date (day/month/year) 01 October 1999 (01.10.99)	Priority date (day/month/year)
Applicant PHELAN, John, Roux et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
08 March 2001 (08.03.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer CROCI Christelle
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

ENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DN1999219PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 99/ 22882	International filing date (day/month/year) 01/10/1999	(Earliest) Priority Date (day/month/year)
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 04 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/22882

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No

P US 99/22882

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60C23/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 936 089 A (BRIDGESTONE FIRESTONE INC) 18 August 1999 (1999-08-18) cited in the application column 7, line 15 - line 29; figure 8	1,10,11
Y	---	6,8,19, 20
Y	EP 0 389 406 A (GOODYEAR TIRE & RUBBER) 26 September 1990 (1990-09-26) column 9, line 51 -column 10, line 9; figure 5	6,8,19, 20
A	DE 37 05 617 A (ERTZ JOSEF) 1 September 1988 (1988-09-01) claim 1; figures --- -/--	18

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

30 May 2000

Date of mailing of the international search report

03.08.2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

HAGEMAN M.

INTERNATIONAL SEARCH REPORT

International Application No

PO/US 99/22882

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GB 2 088 607 A (DUNLOP LTD) 9 June 1982 (1982-06-09) page 2, line 83 - line 110; figure -----</p>	18

INTERNATIONAL SEARCH REPORT

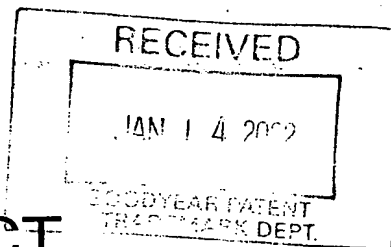
Information on patent family members

International Application No

PCT/US 99/22882

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0936089 A	18-08-1999	US 6030478 A BR 9900554 A JP 11278021 A	29-02-2000 04-01-2000 12-10-1999
EP 0389406 A	26-09-1990	US 4911217 A AU 629318 B AU 5218790 A BR 7001560 U CA 2006989 A DE 69011554 D DE 69011554 T ES 2062479 T	27-03-1990 01-10-1992 27-09-1990 05-11-1991 24-09-1990 22-09-1994 23-03-1995 16-12-1994
DE 3705617 A	01-09-1988	NONE	
GB 2088607 A	09-06-1982	AU 7765181 A DE 3145866 A FR 2494194 A JP 57114709 A	27-05-1982 01-07-1982 21-05-1982 16-07-1982

PATENT COOPERATION TREATY



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

COHN, Howard M.
The Goodyear Tire & Rubber Co.
c/o Robert W. Brown Dept. 823
1144 East Market Street
Akron, OH 44309-3531
ETATS-UNIS D'AMERIQUE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)

Date of mailing
(day/month/year) 03.01.2002

Applicant's or agent's file reference
DN1999219PCT

IMPORTANT NOTIFICATION

International application No.
PCT/US99/22882

International filing date (day/month/year)
01/10/1999

Priority date (day/month/year)
01/10/1999

Applicant
THE GOODYEAR TIRE & RUBBER COMPANY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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Authorized officer

Reiff, U

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JB

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference DN1999219PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/22882	International filing date (day/month/year) 01/10/1999	Priority date (day/month/year) 01/10/1999
International Patent Classification (IPC) or national classification and IPC B60C23/04		
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 13 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 08/03/2001	Date of completion of this report 03.01.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hauser-Schmieg, M Telephone No. +49 89 2399 8478



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/22882

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-4,7-17	as published			
5,6	as received on	03/11/2001	with letter of	05/10/2001

Claims, No.:

1-24	as received on	03/11/2001	with letter of	05/10/2001
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Drawings, sheets:

1/7-7/7	as received on	03/11/2001	with letter of	05/10/2001
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/22882

- ☐ the description, pages:
☒ the claims, Nos.: 25-32
☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
☒ claims Nos. 15-24.

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☒ no international search report has been established for the said claims Nos. 15-24.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/22882

- ☐ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☐ not complied with for the following reasons:
4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-14.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 2-4, 6, 9, 14
	No:	Claims 1, 5, 7-8, 10-13
Inventive step (IS)	Yes:	Claims
	No:	Claims 2-4, 6, 9, 14
Industrial applicability (IA)	Yes:	Claims 1-14
	No:	Claims

2. Citations and explanations see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/22882

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

To Chapter I.

I.5. Disclosure of the Amendments in the Application Documents as originally filed

The amendments filed with letter of 05.10.2001 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34 (2) (b) PCT; further reference is made to the International Preliminary Examination Guidelines, part IV, chapter VI, paragraphs 7.9 and 7.13.

The amendments concerned are the those of the last feature in claim 1, namely:

- when the electronic tag (40) is attached to the patch, the electronic tag is external to the patch (70) and the side (74) of the electronic tag (40) abuts the arcuately-shaped side of the patch.

This feature is not explicitly disclosed in the application documents as originally filed; as is defined in the feature of claim 1 immediately above the last feature, the externally threaded member having a portion extending from a side of the electronic tag is threadably received by the internally threaded member; consequently, the externally threaded member may be regarded as being part of the tag (which is also supported by / described in that way in the description, see page 7, line 31 to page 8, line 5) which is received by the internally threaded member of the patch - thus, the tag may be regarded as being at least partly internal of the patch. In the following, claim 1 is evaluated as if such amendments have not been made.

To Chapters III. and IV.

The International Preliminary Examination Authority agrees with the arguments put forward by the International Searching Authority in the "Invitation to pay additional Fees" according to PCT Article 17 (3) (a) and Rule 40.1 dated 06/06/2000 with respect to lack of unity between the separate inventions claimed in claims 1-14 (corresponding at least partly to the subject-matter claimed in at least part of the claims 1-22 as originally filed) and 15-24 (corresponding to originally filed claims 23-32).

Because no additional search fees have been paid by the applicant and consequently no International Search Report has been established on the subject-matter of claims

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EXAMINATION REPORT - SEPARATE SHEET**

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23-32, the International preliminary examination has been carried out exclusively on the subject-matter of claims 1-14 (Rule 66.1 (e) PCT).

To Chapter V.2.

V.2.1 Claims 1-14 relating to an Apparatus for Mounting an electronic Tag

V.2.1.1. Claim 1

EP 0 936 089 A2 (document D1) shows in figures 1, 2, 6 and 8 and describes in the abstract and column 7, lines 15-29 of the description, in conjunction with a pneumatic tire having a radially-extending belt disposed radially inwardly of the tread and a radially-extending innerliner (75) disposed radially inwardly of the belt, an

- apparatus (120) for mounting an electronic tag (70, 110) within the tire, the apparatus comprising a patch (10, 120) having a first side for mounting against the innerliner (75) of the tire (70), a second arcuately-shaped side and an internally threaded (122) member (124) for threadably receiving an externally threaded member (112) having a portion extending from a side of the electronic tag (110),

wherein,

- when the electronic tag (70, 110) is attached to the patch (10, 120), the electronic tag (70, 110), except the portion of externally threaded member (112) received by the internally threaded member (122) of the patch (10, 120), is external to the patch (10, 120), and the side of the electronic tag (70, 110) abuts the arcuately-shaped side of the patch (10, 120) (comment: at least at the antenna portion (72) of the tag (70) in figure 6).

Therefore, the present application does not satisfy the criterion set forth in Article 33 (2) PCT because the subject-matter of independent claim 1 is not new in respect of prior art as defined in the regulations (Rule 64 (1)-(3) PCT).

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EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US99/22882

V.2.1.2. Claims 2-14 depending on Claim 1

Claims 2-14 depending on claim 1 and having as subject-matter special embodiments of the invention according to claim 1 do not fulfil the provisions of the PCT (Art. 33 and Rule 6 PCT) since their validity is dependent on that of claim 1, which has been denied.

Further, the features of the following claims do not add new features or anything of inventive significance (in the sense of Arts. 33 (2) or (3) PCT) to the subject-matter of claim 1, the features being -at least per se - known from the documents listed below:

- claims 2-5: D1, see figures 6-8;
- claims 6-9: D1, see claim 1 and column 4, lines 19-21; DE 37 05 617 A1
(document D2), claim 1 and column 2, lines 7-11; EP 0 389 406 A2
(document D3), figures 2-5;
- claim 10: D1, claim 2;
- claims 11-13: D1, figures 6-8;
- claim 14: D2, abstract + claim 1.

V.2.3. Industrial Applicability

The claims seem to fulfil the provisions of Art. 33 (4) PCT, because corresponding apparatae can be produced and used - at least in the tire industry.

To Chapter VII.

VII.1 In the Claims

Claims 15-24 should have been deleted (lack of unity of invention, see Chapter IV of this written opinion and the reasoned statement of the International Searching Authority, Invitation to pay additional fees, of 06/06/2000).

Claim 1 does not meet the requirements of Rule 6.3 (b) PCT, because it is not properly cast in the two part form, with those features which in combination are part of the closest prior art (see document D1) being placed in the preamble.

**INTERNATIONAL PRELIMINARY
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VII.2 In the Description

The parts of the description related to claims 15-24 or at least references made thereto as a/- part/s belonging to the invention should have been deleted from the description (see above).

A short reference to the claims should have been made in the description (Art. 6 PCT: support of the claims by the description).

To Chapter VIII.

VIII.1 Clarity

The application does not meet the requirements of Article 6 PCT because claims 1 and 11 are not clear, especially with respect to the definition of the tire, i.e. whether the scope of protection includes a correspondingly defined tire or not.

VIII.2 General Statement with Regard to the Subject-Matter of the present Application

The subject-matter of the invention shown in figures 1 and 2 seems to be clearly different from that one disclosed in the state of the art; a claim defining clearly and sufficiently the distinguishing additional features, preferably in terms of parts of the description, such as

- ... the lens-shaped transverse cross section of the patch having a substantially flat first side (72) of generally circular perimeter for mounting against the inner liner of the tire and a second arcuately-shaped side (73) convex in cross section and ... , the electronic tag (40) having flat side being in abutment with the arcuately shaped side of the patch when the electronic tag (40) is threadably attached to the tag, ..., see especially pages 7 and 8,
could therefore probably fulfill the provisions of Article 33 (2) and (3) PCT.

and the side is substantially straight. The internally threaded member includes a nut; and the externally threaded member includes a bolt.

The electronic tag is adapted, in use, to sense a first temperature which is the temperature of the tire innerliner adjacent to the belt edge; sense a second temperature
5 which is the air temperature within the tire; and sense air pressure within the tire.

BRIEF DESCRIPTION OF THE DRAWINGS

As shown in the drawings, wherein like reference numerals designate like or
10 corresponding parts throughout the several views:

Figure 1 is a partial, one-half, cross-sectional view of a pneumatic tire having mounted therein an electronic tire tag according to the invention;

Figure 2 is an enlarged transverse cross-sectional view of the general details of the tag of Figure 1, showing the encapsulating and mounting structures
15 thereof;

Figure 3 is a block diagram of a portion of an electronic control system according to the invention;

Figure 4 is a block diagram of another portion of the electronic control system shown in Figure 3;

20 Figure 5 is a flow chart portraying a portion of a process according to the invention; and

Figures 6A and 6B comprise a flow chart portraying another portion of the process shown in Figure 4.

DEFINITIONS

25 "Bead" generally means an annularly shaped, member located within either of the inner radial end portions of a tire;

"Bead Portion" generally means either of the opposed radial inner end portions of the carcass of a tire including a bead, the portion of a ply which is looped about the bead, and the rubber material surrounding the bead and ply portion.

30 "Carcass" generally means the tire structure including the beads and ply, but excluding the belt structure, undertread over the ply and the tread.

"Equatorial Plane" means the imaginary plane extending perpendicular to the axis of rotation of the tire and passing through the center of the tread; or the plane containing the circumferential centerline of the tread.

"Ply" generally means a cord-reinforced layer of rubber-coated, radially
5 deployed material.

"Radial" mean directions extending radially toward or away from the axis of rotation of the tire.

"Sidewall" generally means the radially-extending portion of a tire.

"Tread width," means the arc length of the outer circumference of the tread
10 of a tire as viewed in transverse cross-section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows half of a partial transverse cross-sectional view of a typical pneumatic tire 10, for an OTR vehicle 11, mounted on a wheel rim 12 thereof. Since the tire 10 is generally toroidally-shaped and symmetrically arranged with respect to an
15 imaginary equatorial plane 14, the transverse cross-section of the other partial half of the tire 10 includes like or corresponding parts, and it should be understood that the explanation applies to the other half of the tire 10 as well.

The tire 10 which has a cavity 16 for receiving pressurized air when the tire 10 is mounted on the wheel rim 12, generally comprises a central tread 16
20 having opposite sides generally indicated by the numeral 18. In addition, the tire 10 includes a plurality of radially-extending belts, exemplified by the belts 20 and 22, that are centrally disposed radially-inwardly of the tread 16. The belt 20 has opposite side edges 23, and the belt 22 has opposite side edges 24. Further, the tire 10 includes a carcass 25 having opposite sidewalls 27. The respective
25 sidewalls 27 merge with and radially-extend inwardly from opposite tread sides 18 and form therewith opposite shoulder portions generally indicated by the numeral 28. The carcass 25 also includes opposite bead portions 29 at the radial inner ends thereof. Each of the bead portions 29 includes an annularly-shaped bead 29A therein for urging the bead portions 29 into abutment with the wheel rim 12.
30 Moreover, the carcass 25 includes one or more plies 30, radially disposed inwardly of the belts 20 and 22. The ply 30 radially extends between and is

What is claimed is:

1. In conjunction with a pneumatic tire (10) having a central tread (16), a radially-extending belt (20) disposed radially inwardly of the tread (16) and a radially-
5 extending innerliner (35) disposed radially inwardly of the belt (16), apparatus for mounting an electronic tag (40) within the tire, characterized by:

a patch (70) having a first side (72) for mounting against the innerliner of the tire, a second arcuately-shaped side (73) and an internally threaded member (71) for threadably receiving an externally threaded member (64) having a portion extending from a side (74)
10 of the electronic tag (40);

wherein:

when the electronic tag (40) is attached to the patch (70), the electronic tag (40) is external to the patch (70), and the side (74) of the electronic tag (40) abuts the arcuately-shaped side (73) of the patch (70).
15

2. Apparatus, according to claim 1, characterized in that:

when the externally threaded member is threaded into the internally threaded member, a flat side (74) of the tag is in abutment with the arcuately-shaped side of the patch.
20

3. Apparatus, according to claim 1, characterized in that:

when the externally threaded member is threaded into the internally threaded member, a flat side (74) of the tag is partially in abutment with the arcuately-shaped side of the patch.
25

4. Apparatus, according to claim 3, characterized in that:

when the externally threaded member is threaded into the internally threaded member, approximately one-half of a flat side (74) of the tag is substantially in abutment with the arcuately-shaped side of the patch.
30

5. Apparatus, according to claim 1, characterized in that:

the internally threaded member includes a nut (71).

6. Apparatus, according to claim 1, characterized in that:
the patch is mounted to the innerliner adjacent a shoulder portion (28) of the tire.

5

7. Apparatus, according to claim 1, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the tire is
thickest.

10

8. Apparatus, according to claim 1, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the tire is
least able to dissipate heat.

15

9. Apparatus, according to claim 1, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the
temperature samples are the most closely related to determining whether or not an internal
breakdown of the tire is imminent.

20

10. Apparatus, according to claim 1, characterized in that:
the patch comprises vulcanized rubber.

11. Apparatus, according to claim 1, characterized in that:
the side of the tag from which the externally threaded member extends is flat.

25

12. Apparatus, according to claim 1, characterized in that:
the tag is substantially rectangularly-shaped and the side is substantially straight.

30

13. Apparatus, according to claim 1, characterized in that:
the internally threaded member includes a nut (71); and
the externally threaded member includes a bolt (64).

14. Apparatus, according to claim 1, characterized in that:

the electronic tag is adapted, in use, to:

sense (44) a first temperature which is the temperature of the tire innerliner adjacent to the belt edge;

5 sense (46) a second temperature which is the air temperature within the tire; and

sense (48) air pressure within the tire.

15. Electronic tag (40) for monitoring conditions of a pneumatic tire (10), the pneumatic tire comprising a central tread (16), a radially-extending belt (20) disposed
10 radially inwardly of the tread (16) and a radially-extending innerliner (35) disposed radially inwardly of the belt (16), the belt (20) having a side edge (23), characterized by:

a first sensor (44) for sensing a first temperature which is the temperature of the tire innerliner adjacent to the belt edge;

15 a second sensor (46) for sensing a second temperature which is the air temperature within the tire; and

a third sensor (48) for sensing air pressure within the tire.

16. Electronic tag, according to claim 15, characterized by:

20 a microcontroller (42) for enabling sensing the conditions at a sequence of discrete time intervals.

17. Electronic tag, according to claim 16, characterized by:

25 the microcontroller compares a value of one or more of the conditions sensed at an immediately previous time interval to a current value of the one or more conditions.

18. Electronic tag, according to claim 16, characterized by:

30 at a current time interval, the microcontroller determines whether select one or more of the conditions has changed by a threshold amount since an immediately previous time interval.

19. Electronic tag, according to claim 18, characterized in that:

the select one or more conditions is either or both of the first and second temperatures; and

the threshold amount is plus or minus two degrees centigrade.

5 20. Electronic tag, according to claim 18, characterized in that:

the select one or more conditions is the air pressure within the tire; and

the threshold amount is plus or minus two pounds per square inch.

10 21. Electronic tag, according to claim 15, characterized in that:

the electronic tag is disposed adjacent a shoulder portion (28) of the tire.

22. Electronic tag, according to claim 15, characterized by:

the electronic tag is disposed at an area of the innerliner where the tire is thickest.

15 23. Electronic tag, according to claim 15, characterized by:

the electronic tag is disposed at an area of the innerliner where the tire is least able to dissipate heat.

24. Electronic tag, according to claim 15, characterized by:

20 the electronic tag is disposed at an area of the innerliner where the temperature samples are the most closely related to determining whether or not an internal breakdown of the tire is imminent.

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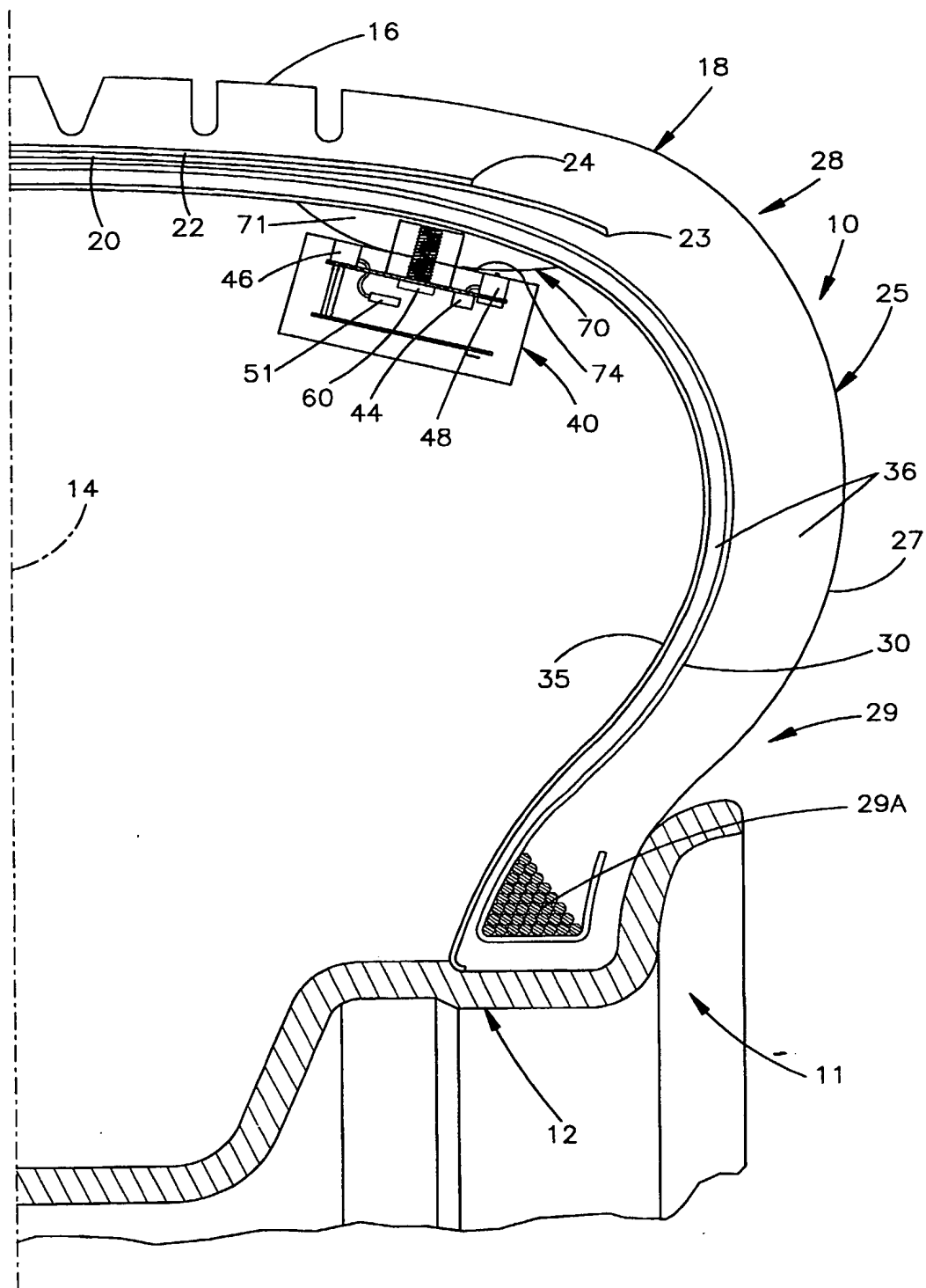


Figure 1

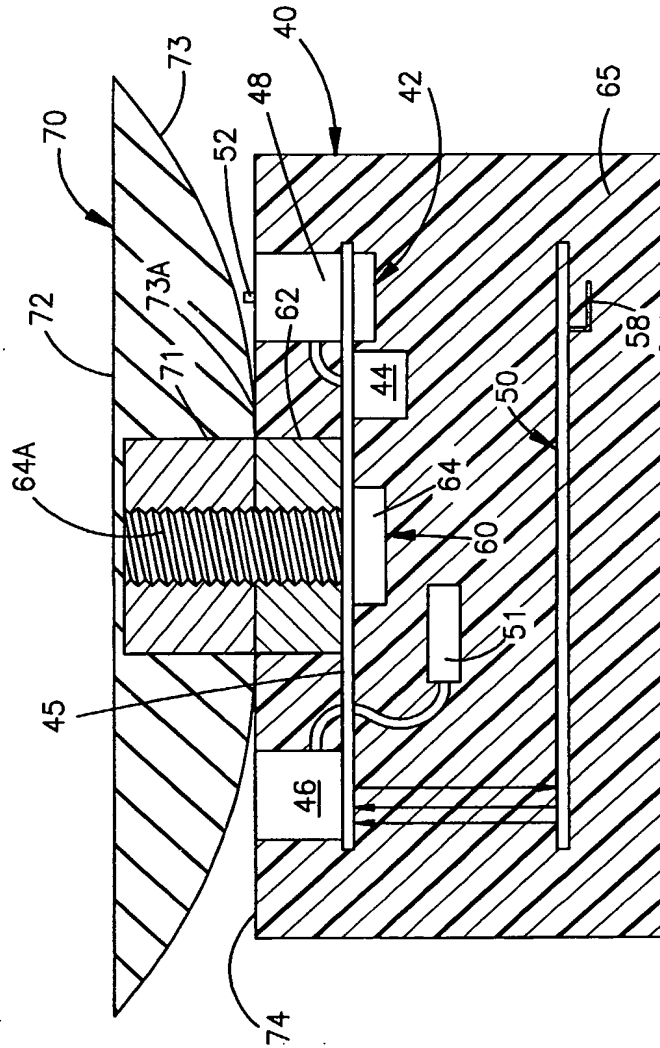


Figure 2

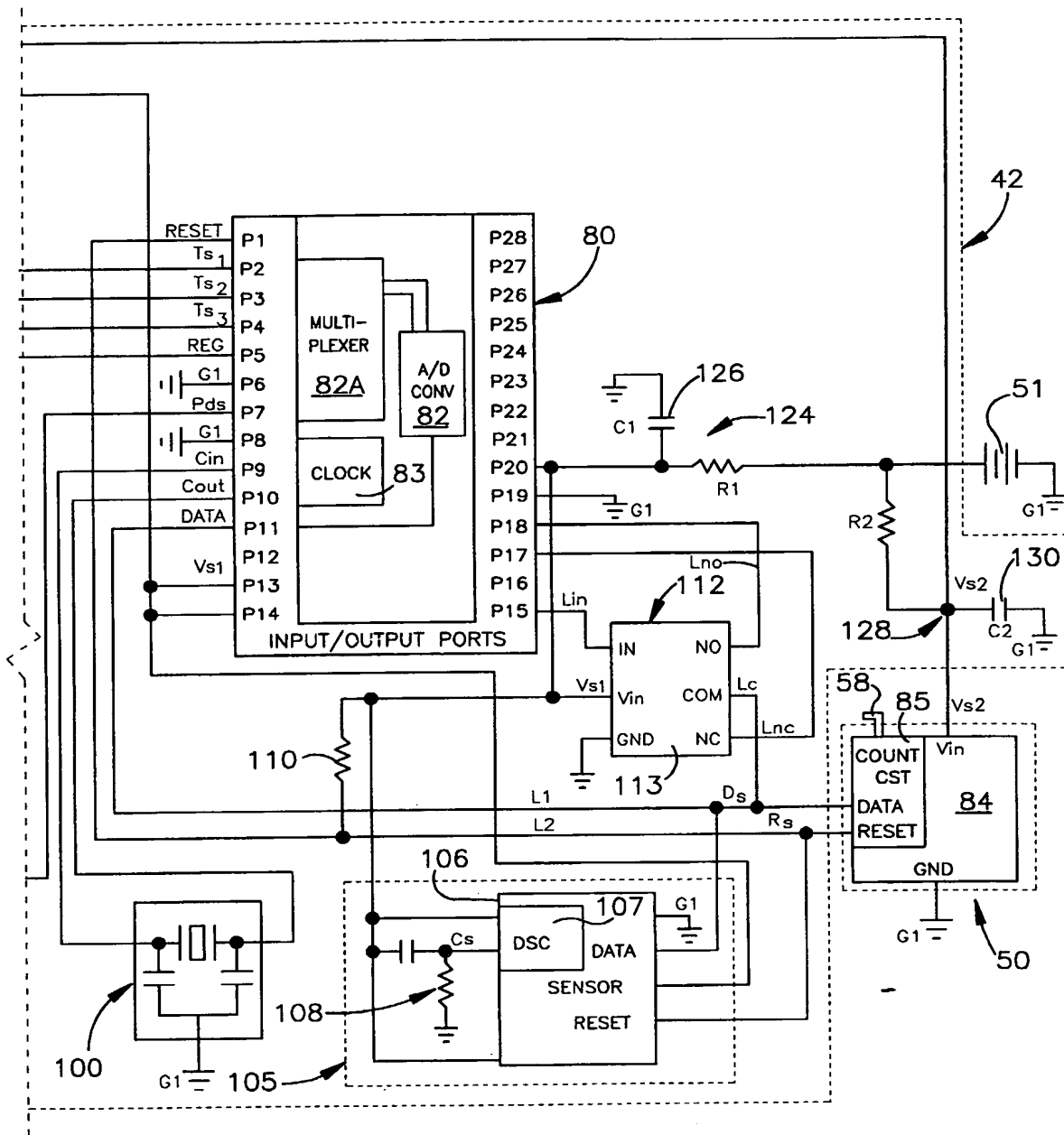


Figure 3

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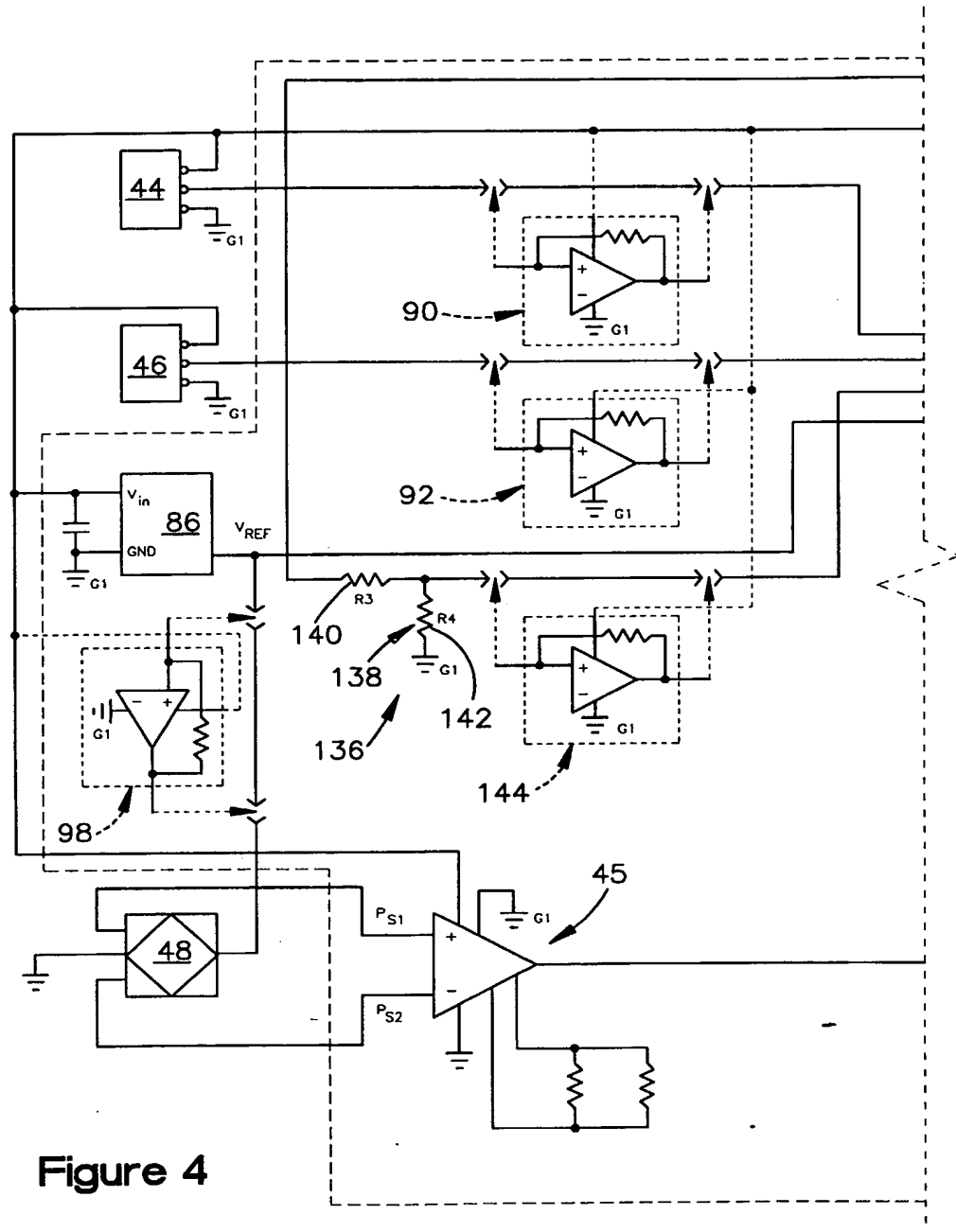


Figure 4

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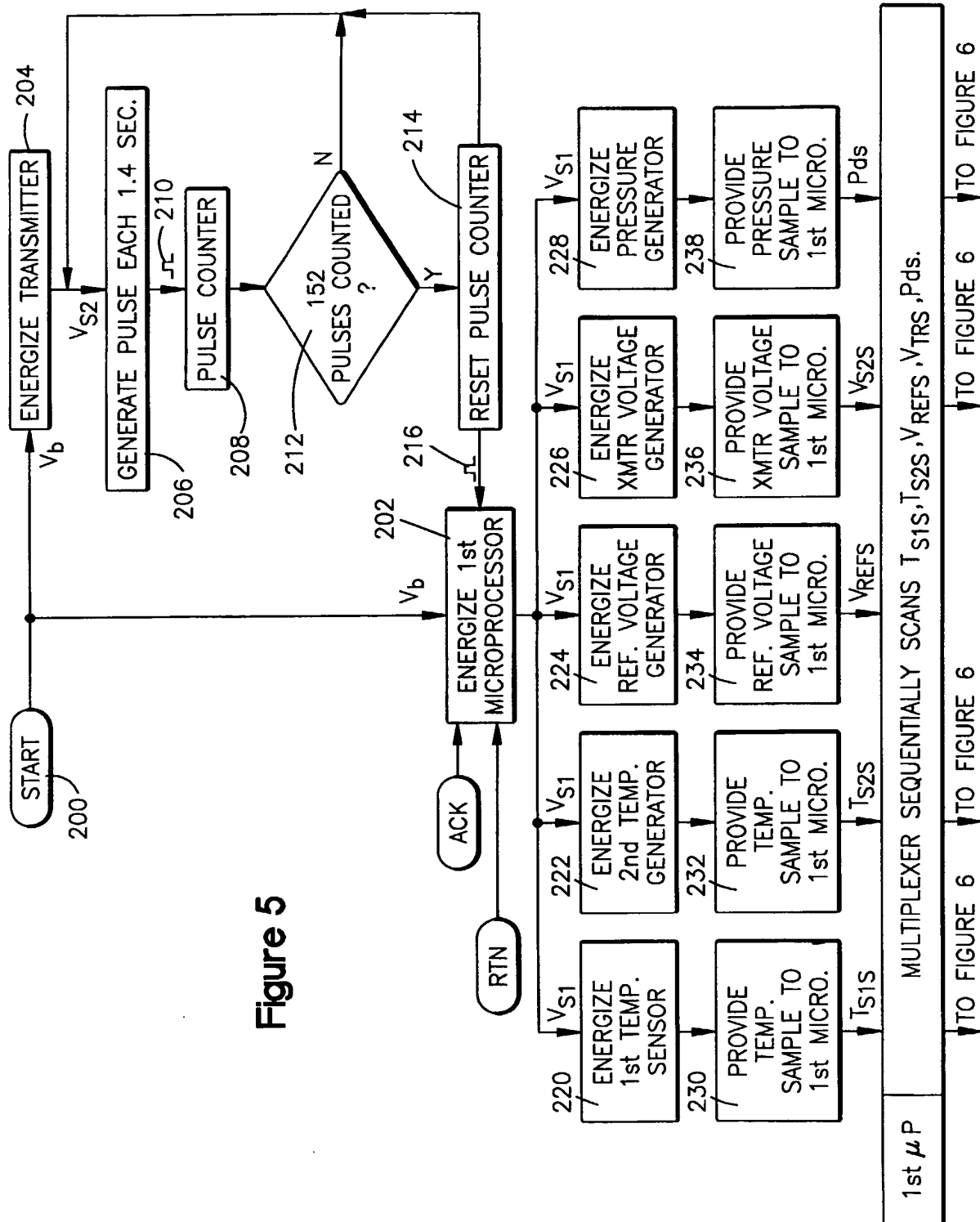


Figure 5

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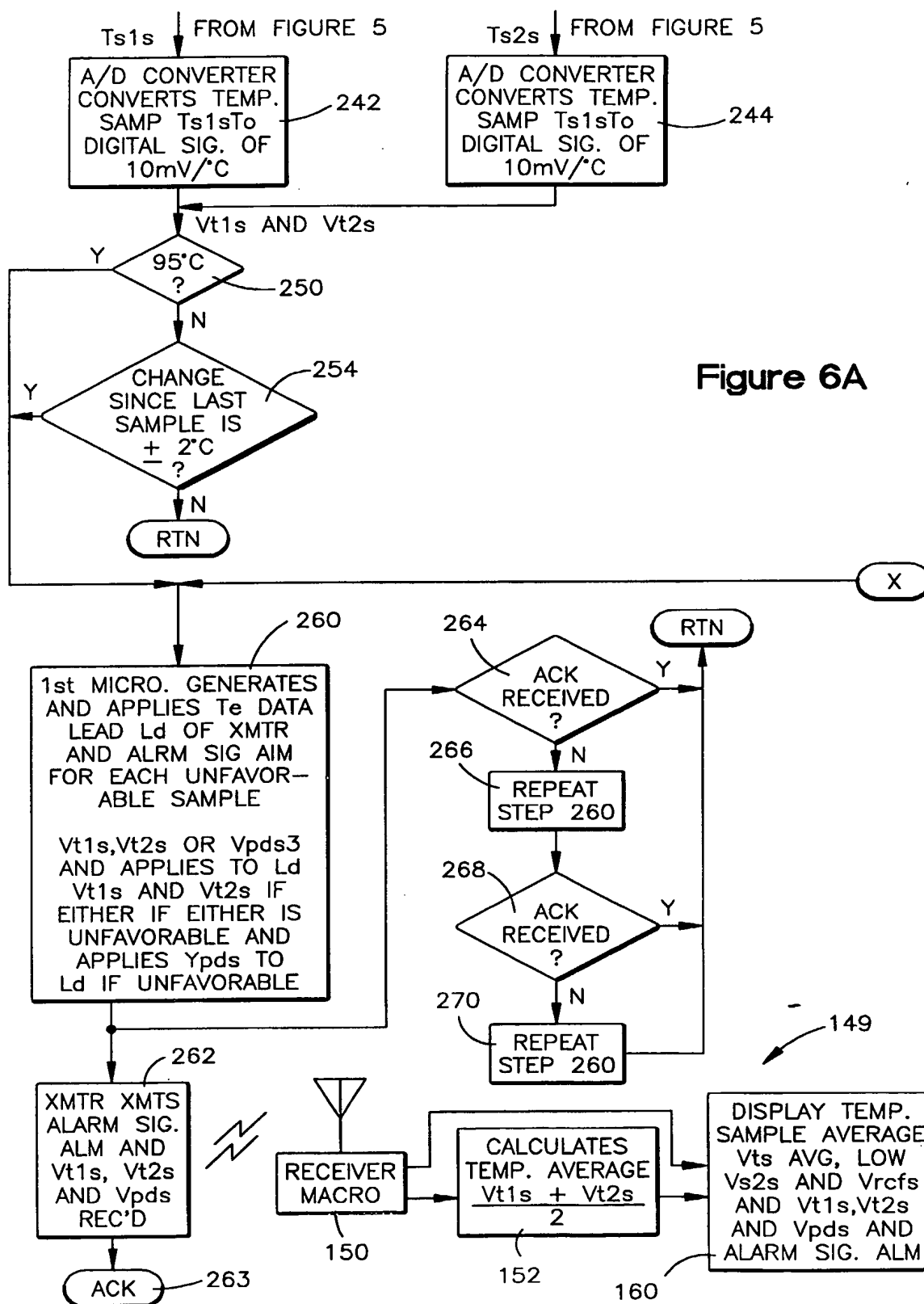


Figure 6A

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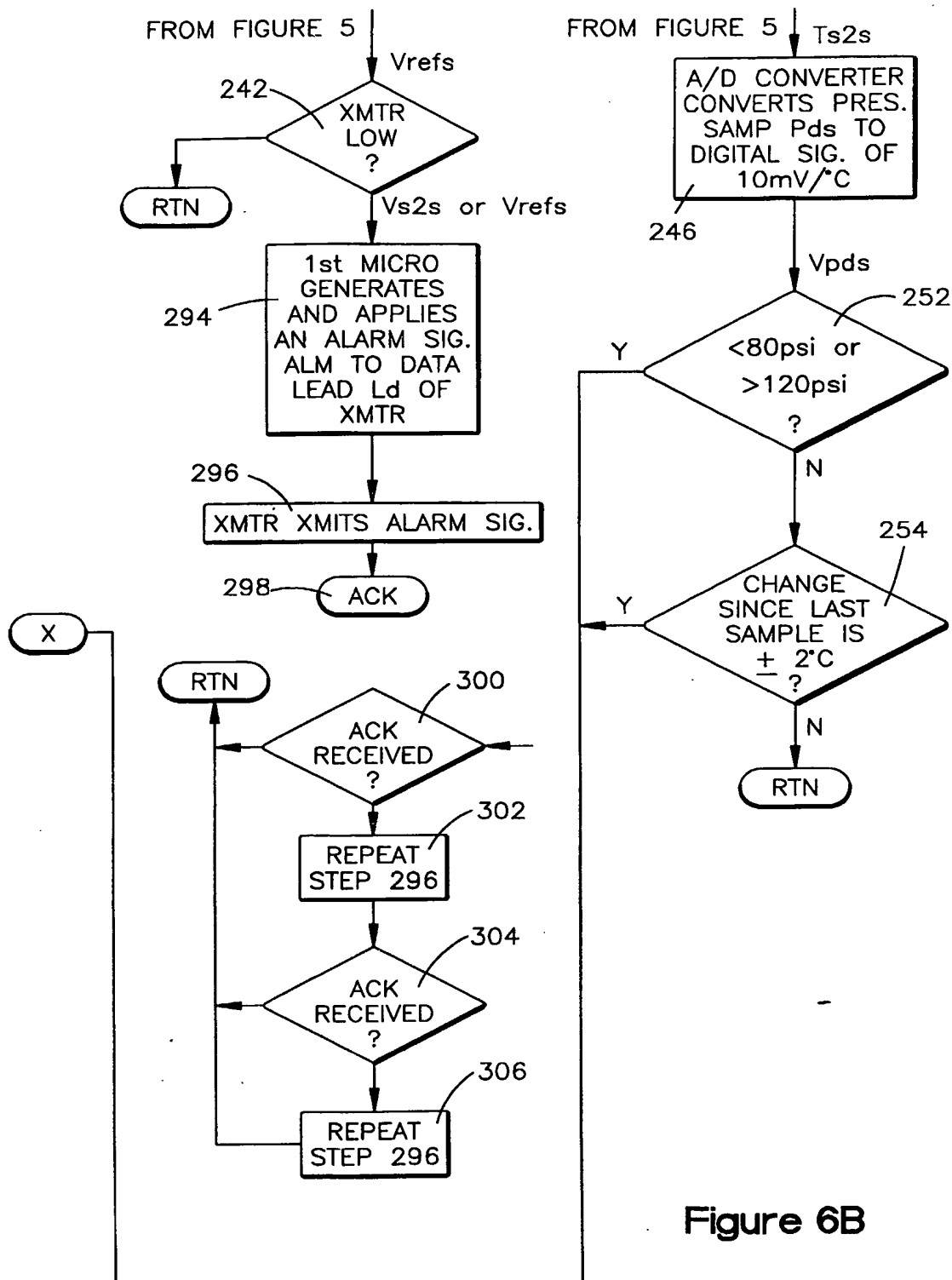


Figure 6B

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

To:
The Goodyear Tire and Rubber Comp.
c/o Robert W. Brown-Dept 823
Attn. COHN, H.
1144 East Market Street
Akron, Ohio 44309-3531
UNITED STATES OF AMERICA

Date of mailing
(day/month/year) 03/08/2000

Applicant's or agent's file reference
DN1999219PCT

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/US 99/ 22882

International filing date
(day/month/year) 01/10/1999

Applicant

THE GOODYEAR TIRE & RUBBER COMPANY et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.


☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority
 European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Maggie Perrin

RECEIVED

AUG 10 2000

GOODYEAR PATENT
& TRADEMARK DEPT.

AUG 10 2000

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DN1999219PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 99/ 22882	International filing date (day/month/year) 01/10/1999	(Earliest) Priority Date (day/month/year)
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 04 sheets.
☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☐ as suggested by the applicant.
- ☒ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/22882

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTEP IONAL SEARCH REPORT

onal Application No
PCT/US 99/22882

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60C23/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 936 089 A (BRIDGESTONE FIRESTONE INC) 18 August 1999 (1999-08-18) cited in the application column 7, line 15 - line 29; figure 8	1,10,11
Y	---	6,8,19, 20
Y	EP 0 389 406 A (GOODYEAR TIRE & RUBBER) 26 September 1990 (1990-09-26) column 9, line 51 -column 10, line 9; figure 5	6,8,19, 20
A	---	18
	DE 37 05 617 A (ERTZ JOSEF) 1 September 1988 (1988-09-01) claim 1; figures	

	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

30 May 2000

Date of mailing of the international search report

03. 08. 2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

HAGEMAN M.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/22882

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 088 607 A (DUNLOP LTD) 9 June 1982 (1982-06-09) page 2, line 83 - line 110; figure -----	18

INTERNATIONAL SEARCH REPORT

Information on patent family members

Original Application No

PCT/US 99/22882

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0936089	A	18-08-1999	US 6030478 A	29-02-2000
			BR 9900554 A	04-01-2000
			JP 11278021 A	12-10-1999

EP 0389406	A	26-09-1990	US 4911217 A	27-03-1990
			AU 629318 B	01-10-1992
			AU 5218790 A	27-09-1990
			BR 7001560 U	05-11-1991
			CA 2006989 A	24-09-1990
			DE 69011554 D	22-09-1994
			DE 69011554 T	23-03-1995
			ES 2062479 T	16-12-1994

DE 3705617	A	01-09-1988	NONE	

GB 2088607	A	09-06-1982	AU 7765181 A	27-05-1982
			DE 3145866 A	01-07-1982
			FR 2494194 A	21-05-1982
			JP 57114709 A	16-07-1982

and the side is substantially straight. The internally threaded member includes a nut; and the externally threaded member includes a bolt.

The electronic tag is adapted, in use, to sense a first temperature which is the temperature of the tire innerliner adjacent to the belt edge; sense a second temperature
5 which is the air temperature within the tire; and sense air pressure within the tire.

BRIEF DESCRIPTION OF THE DRAWINGS

As shown in the drawings, wherein like reference numerals designate like or
10 corresponding parts throughout the several views:

Figure 1 is a partial, one-half, cross-sectional view of a pneumatic tire having mounted therein an electronic tire tag according to the invention;

Figure 2 is an enlarged transverse cross-sectional view of the general details of the tag of Figure 1, showing the encapsulating and mounting structures
15 thereof;

Figure 3 is a block diagram of a portion of an electronic control system according to the invention;

Figure 4 is a block diagram of another portion of the electronic control system shown in Figure 3;

20 Figure 5 is a flow chart portraying a portion of a process according to the invention; and

Figure 6 is a flow chart portraying another portion of the process shown in Figure 4.

DEFINITIONS

25 "Bead" generally means an annularly shaped, member located within either of the inner radial end portions of a tire;

"Bead Portion" generally means either of the opposed radial inner end portions of the carcass of a tire including a bead, the portion of a ply which is looped about the bead, and the rubber material surrounding the bead and ply portion.

30 "Carcass" generally means the tire structure including the beads and ply, but excluding the belt structure, undertread over the ply and the tread.

"Equatorial Plane" means the imaginary plane extending perpendicular to the axis of rotation of the tire and passing through the center of the tread; or the plane containing the circumferential centerline of the tread.

5 "Ply" generally means a cord-reinforced layer of rubber-coated, radially deployed material.

"Radial" mean directions extending radially toward or away from the axis of rotation of the tire.

"Sidewall" generally means the radially-extending portion of a tire.

10 "Tread width," means the arc length of the outer circumference of the tread of a tire as viewed in transverse cross-section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows half of a partial transverse cross-sectional view of a typical pneumatic tire 10, for an OTR vehicle 11, mounted on a wheel rim 12 thereof. Since the tire 10 is generally toroidally-shaped and symmetrically arranged with respect to an
15 imaginary equatorial plane 14, the transverse cross-section of the other partial half of the tire 10 includes like or corresponding parts, and it should be understood that the explanation applies to the other half of the tire 100 as well.

The tire 10 which has a cavity 16 for receiving pressurized air when the tire 10 is mounted on the wheel rim 12, generally comprises a central tread 16 having
20 opposite sides generally indicated by the numeral 18. In addition, the tire 10 includes a plurality of radially-extending belts, exemplified by the belts 20 and 22, that are centrally disposed radially-inwardly of the tread 16. The belt 20 has opposite side edges 23, and the belt 22 has opposite side edges 24. Further, the tire 10 includes a carcass 25 having opposite sidewalls 27. The respective
25 sidewalls 27 merge with and radially-extend inwardly from opposite tread sides 18 and form therewith opposite shoulder portions generally indicated by the numeral 28. The carcass 25 also includes opposite bead portions 29 at the radial inner ends thereof. Each of the bead portions 29 includes an annularly-shaped bead 29A therein for urging the bead portions 29 into abutment with the wheel rim 12.
30 Moreover, the carcass 25 includes one or more plies 30, radially disposed inwardly of the belts 20 and 22. The ply 30 radially extends between and is

What is claimed is:

1. In conjunction with a pneumatic tire (10) having a central tread (16), a radially-extending belt (20) disposed radially inwardly of the tread (16) and a radially-extending innerliner (35) disposed radially inwardly of the belt (16), apparatus for mounting an electronic tag (40) within the tire, characterized by:
 - a patch (70) having a first side (72) for mounting against the innerliner of the tire, a second arcuately-shaped side (73) and an internally threaded member (71) for threadably receiving an externally threaded member (64) having a portion extending from a side (74) of an electronic tag (40).
2. Apparatus, according to claim 1, characterized in that:
 - when the externally threaded member is threaded into the internally threaded member, a flat side (74) of the tag is in abutment with the arcuate side of the patch.
3. Apparatus, according to claim 1, characterized in that:
 - when the externally threaded member is threaded into the internally threaded member, a flat side (74) of the tag is partially in abutment with the arcuate side of the patch.
4. Apparatus, according to claim 3, characterized in that:
 - when the externally threaded member is threaded into the internally threaded member, approximately one-half of a flat side (74) of the tag is substantially in abutment with the arcuate side of the patch.
5. Apparatus, according to claim 1, characterized in that:
 - the internally threaded member includes a nut (71).
6. Apparatus, according to claim 1, characterized in that:
 - the patch is mounted to the innerliner adjacent a shoulder portion (28) of the tire.
7. Apparatus, according to claim 1, characterized in that:
 - the patch is mounted to the innerliner at an area of the innerliner where the tire is thickest.
8. Apparatus, according to claim 1, characterized in that:
 - the patch is mounted to the innerliner at an area of the innerliner where the tire is least able to dissipate heat.
9. Apparatus, according to claim 1, characterized in that:

the patch is mounted to the innerliner at an area of the innerliner where the temperature samples are the most closely related to determining whether or not an internal breakdown of the tire is imminent.

10. Apparatus, according to claim 1, characterized in that:

5 the patch comprises vulcanized rubber.

11. In combination with a pneumatic tire (10)

having a central tread (16), a radially-extending belt (20) disposed radially inwardly of the tread (16) and a radially-extending innerliner (35) disposed radially inwardly of the belt (16), apparatus for mounting an electronic tag (40) within the tire, characterized by:

10 a patch (70) having a first side (72) for mounting against the innerliner of the tire, a second arcuately-shaped side (73) and an internally threaded member (71); and

an externally threaded member (64) having a portion extending from a side (74) of the tag and threadable into the internally threaded member of the patch.

12. Apparatus, according to claim 10, characterized in that:

15 the side of the tag from which the externally threaded member extends is flat.

13. Apparatus, according to claim 12, characterized in that:

when the externally threaded member is threaded into the internally threaded member, the flat side of the tag is in abutment with the arcuate side of the patch.

20 14. Apparatus, according to claim 12, characterized in that:

when the externally threaded member is threaded into the internally threaded member, the flat side of the tag is partially in abutment with the arcuate side of the patch.

15. Apparatus, according to claim 14, characterized in that:

25 when the externally threaded member is threaded into the internally threaded member, approximately one-half of the flat side of the tag is substantially in abutment with the arcuate side of the patch.

16. Apparatus, according to claim 10, characterized in that:

the tag is substantially rectangularly-shaped and the side is substantially straight.

30 17. Apparatus, according to claim 10, characterized in that:

the internally threaded member includes a nut (71); and
the externally threaded member includes a bolt (64).

18. Apparatus, according to claim 10, characterized in that:
the electronic tag is adapted, in use, to:
sense (44) a first temperature which is the temperature of the tire innerliner
5 adjacent to the belt edge;
sense (46) a second temperature which is the air temperature within the tire;
and
sense (48) air pressure within the tire.
19. Apparatus, according to claim 10, characterized in that:
10 the patch is mounted to the innerliner adjacent a shoulder portion (28) of the
tire.
20. Apparatus, according to claim 10, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the
tire is thickest.
- 15 21. Apparatus, according to claim 10, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the
tire is least able to dissipate heat.
22. Apparatus, according to claim 10, characterized in that:
the patch is mounted to the innerliner at an area of the innerliner where the
20 temperature samples are the most closely related to determining whether or not an internal
breakdown of the tire is imminent.
23. Electronic tag (40) for monitoring conditions of a pneumatic tire (10), the
pneumatic tire comprising a central tread (16), a radially-extending belt (20) disposed
radially inwardly of the tread (16) and a radially-extending innerliner (35) disposed radially
25 inwardly of the belt (16), the belt (20) having a side edge (23), characterized by:
a first sensor (44) for sensing a first temperature which is the temperature of
the tire innerliner adjacent to the belt edge;
a second sensor (46) for sensing a second temperature which is the air
temperature within the tire; and
30 a third sensor (48) for sensing air pressure within the tire.
24. Electronic tag, according to claim 23, characterized by:

a microcontroller (42) for enabling sensing the conditions at a sequence of discrete time intervals.

25. Electronic tag, according to claim 24, characterized by:

the microcontroller compares a value of one or more of the conditions sensed
5 at an immediately previous time interval to a current value of the one or more conditions.

26. Electronic tag, according to claim 24, characterized by:

at a current time interval, the microcontroller determines whether select one
or more of the conditions has changed by a threshold amount since an immediately previous
time interval.

10 27. Electronic tag, according to claim 26, characterized in that:

the select one or more conditions is either or both of the first and second
temperatures; and

the threshold amount is plus or minus two degrees centigrade.

28. Electronic tag, according to claim 26, characterized in that:

15 the select one or more conditions is the air pressure within the tire; and
the threshold amount is plus or minus two pounds per square inch

29. Electronic tag, according to claim 23, characterized in that:

the electronic tag is disposed adjacent a shoulder portion (28) of the tire.

30. Electronic tag, according to claim 23, characterized by:

20 the electronic tag is disposed at an area of the innerliner where the tire is
thickest.

31. Electronic tag, according to claim 23, characterized by:

the electronic tag is disposed at an area of the innerliner where the tire is
least able to dissipate heat.

25 32. Electronic tag, according to claim 23, characterized by:

the electronic tag is disposed at an area of the innerliner where the
temperature samples are the most closely related to determining whether or not an internal
breakdown of the tire is imminent.

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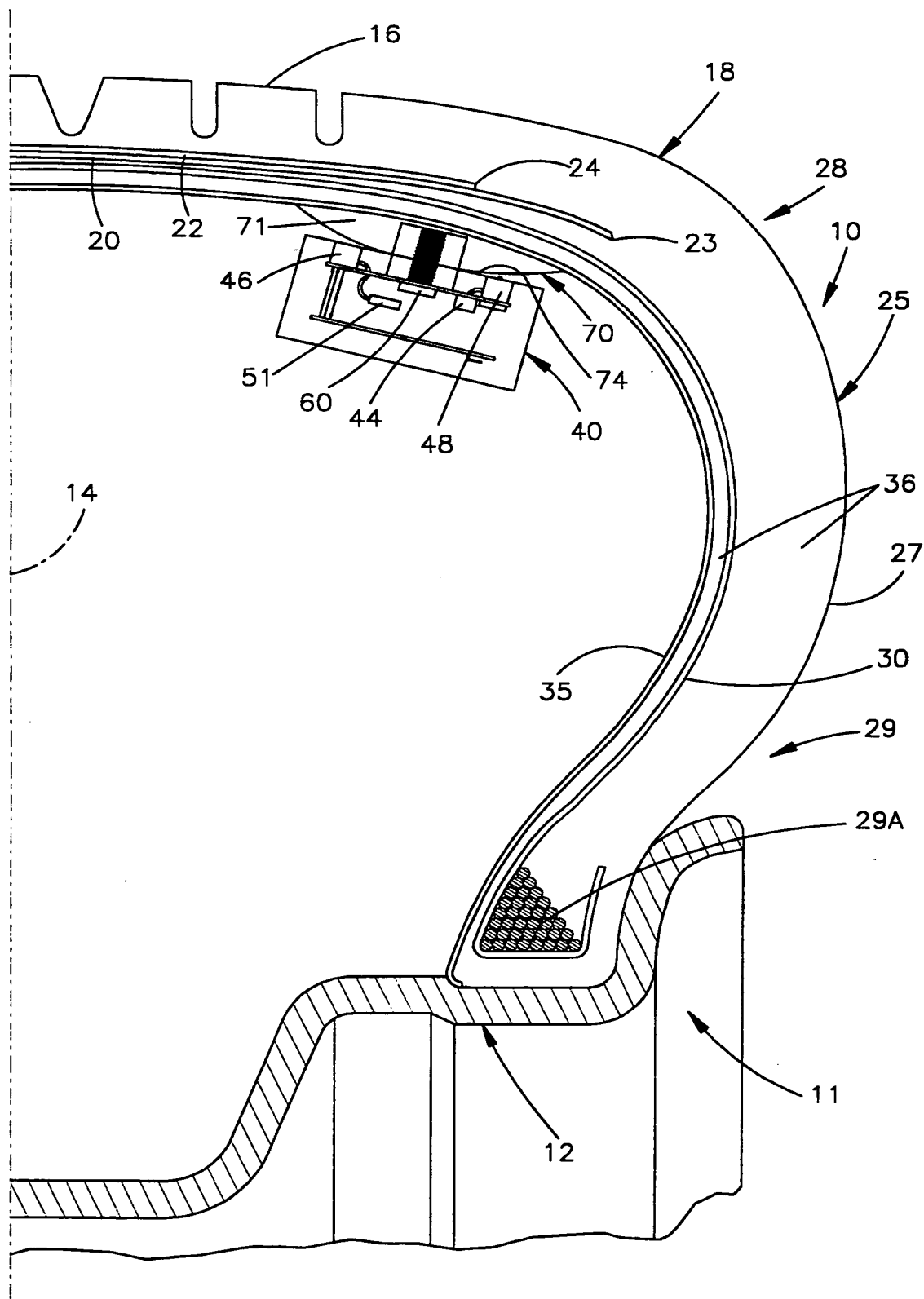


Figure 1

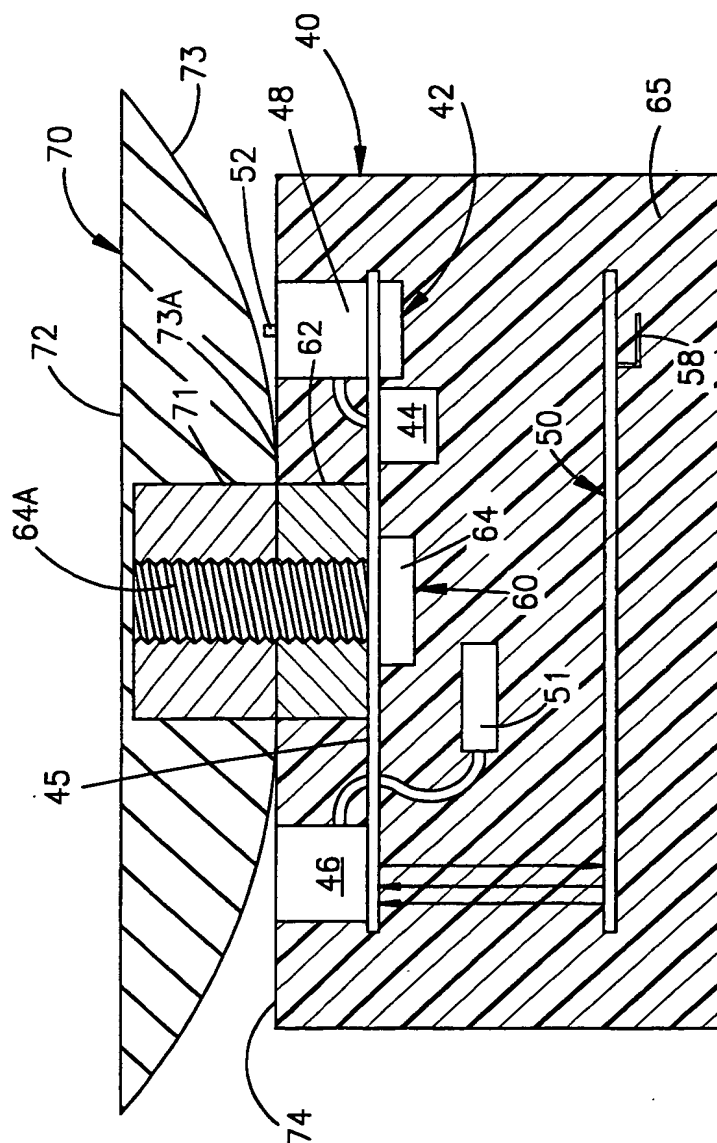


Figure 2

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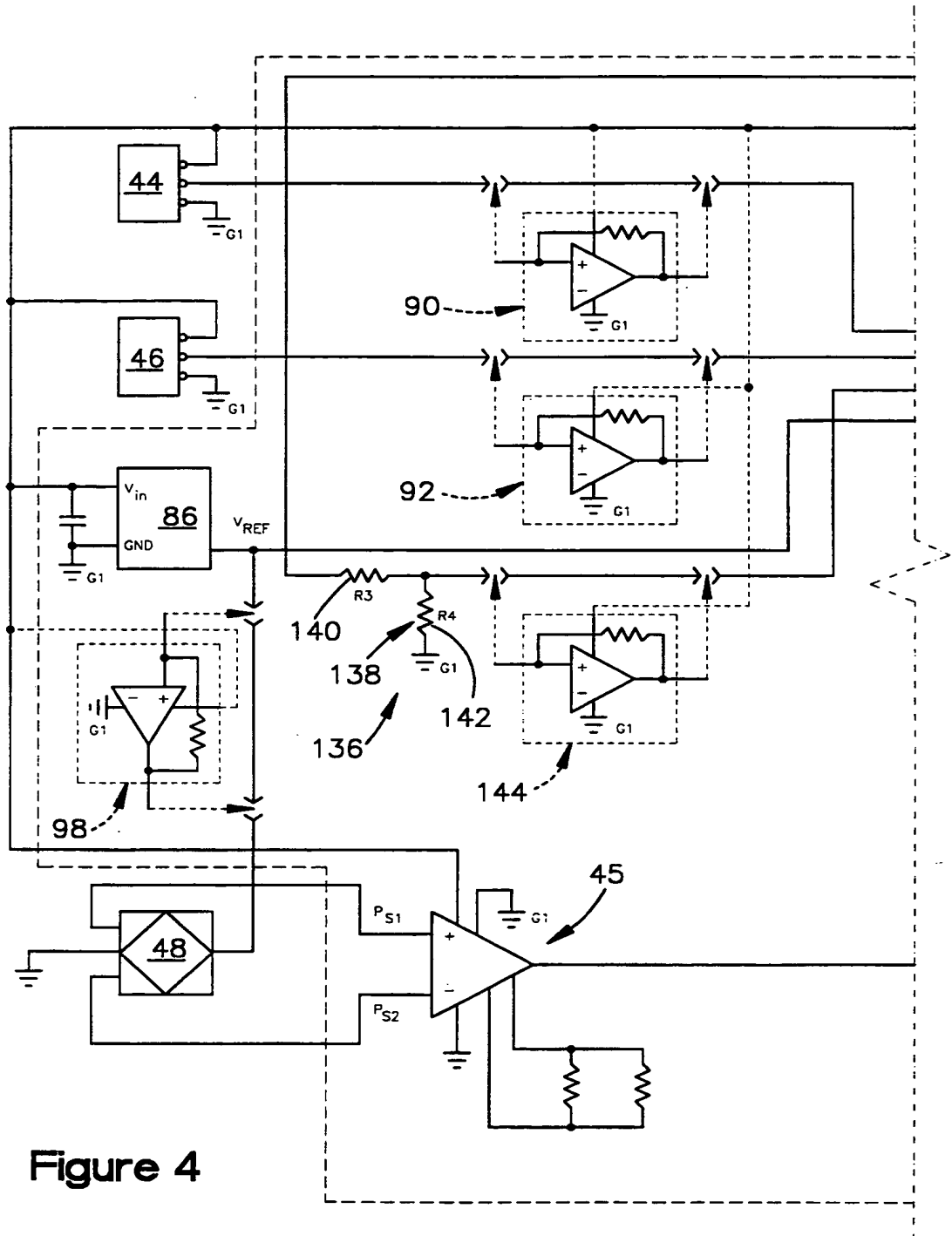
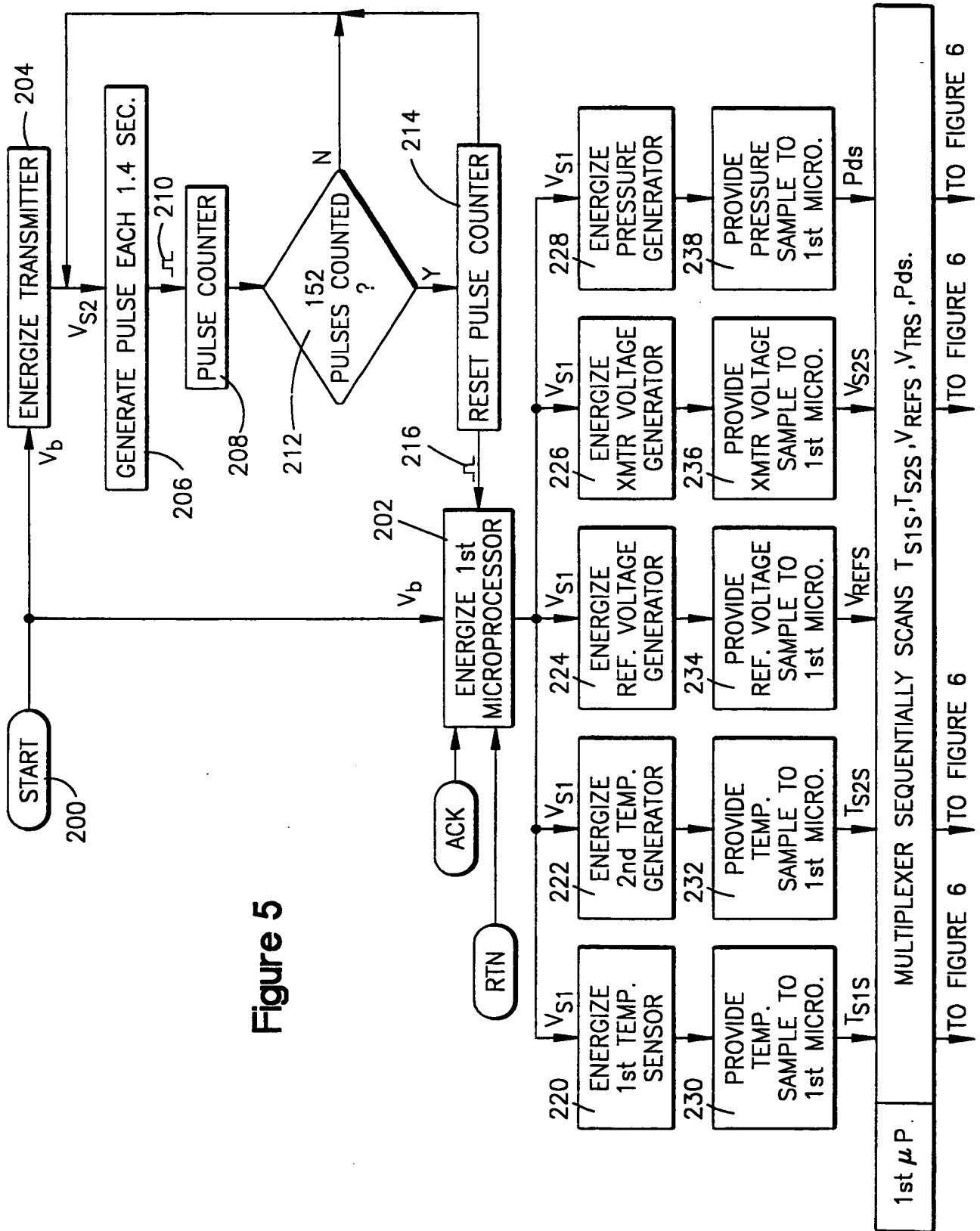
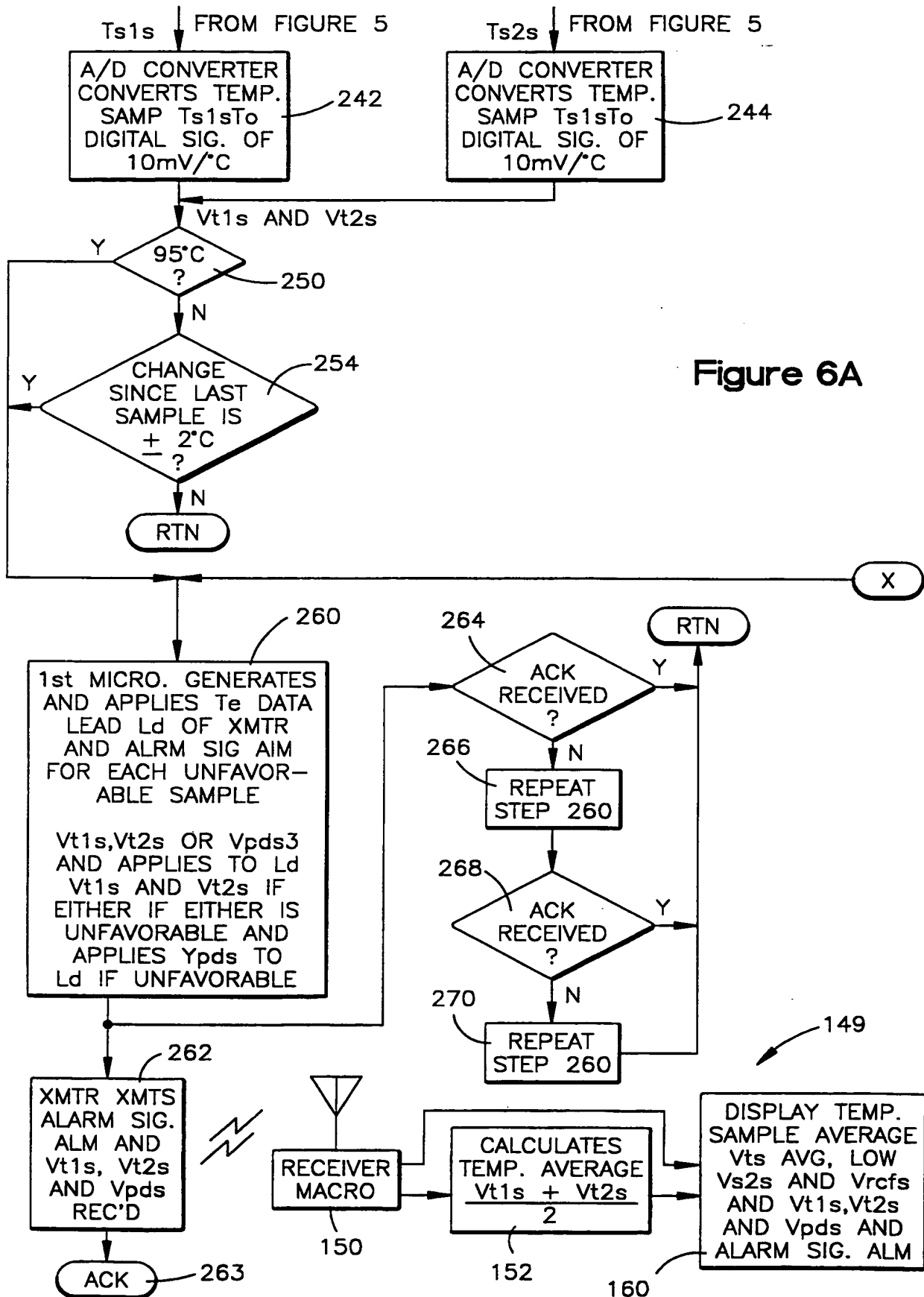


Figure 4

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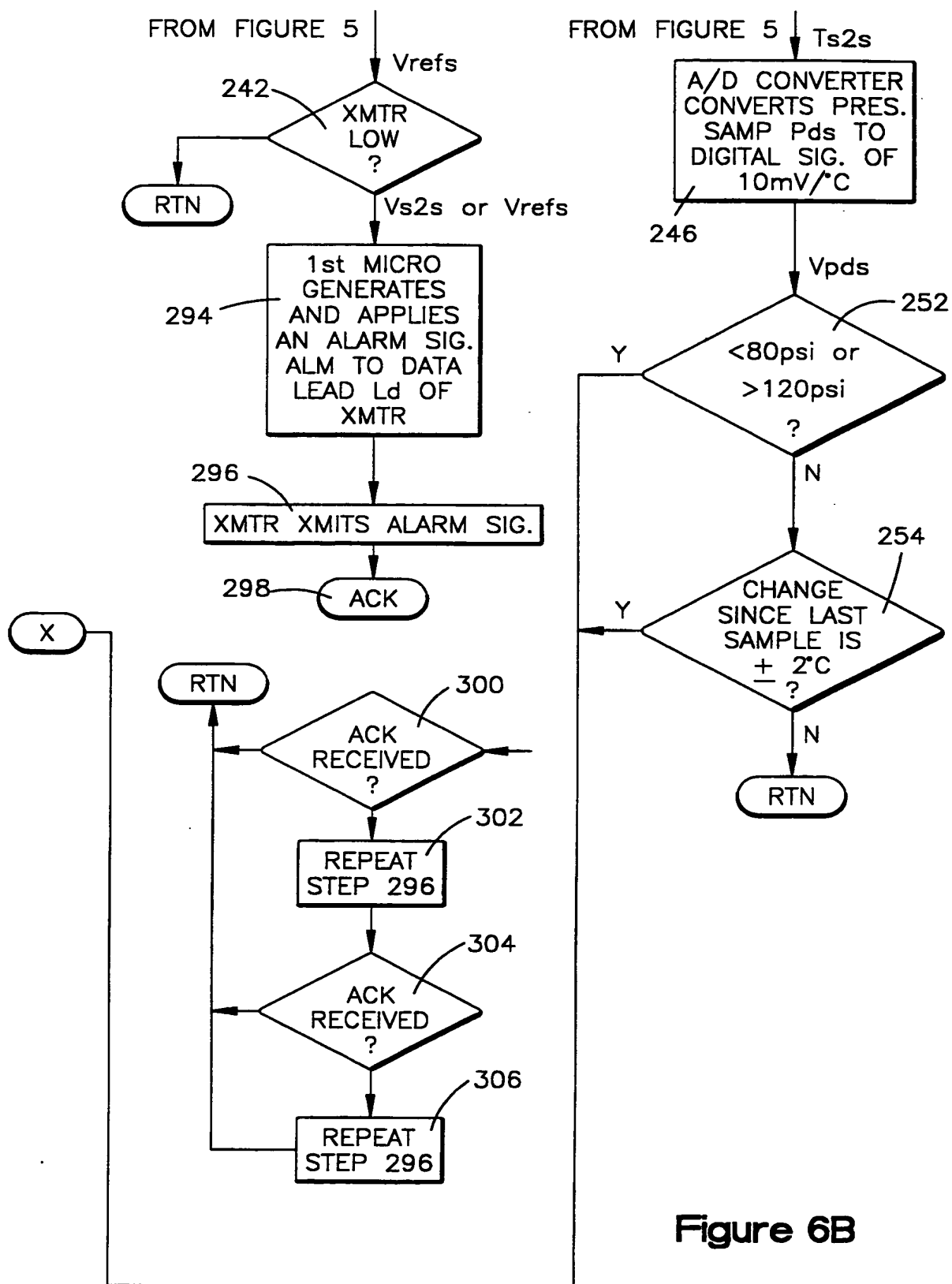


Figure 6B